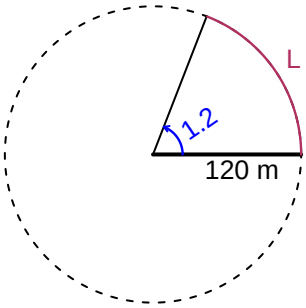
Name: Date:

Trig Final (Solution v47)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.2 radians. The radius is 120 meters. How long is the arc in meters?

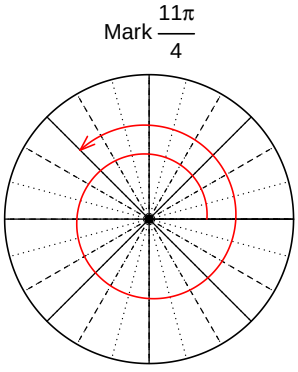


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

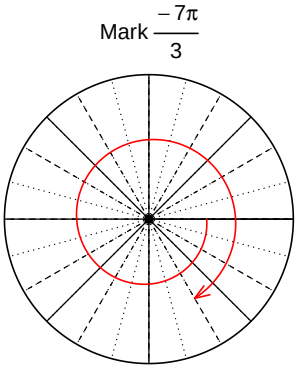
$L = 144$ meters.

Question 2

Consider angles $\frac{11\pi}{4}$ and $\frac{-7\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(\frac{-7\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/4)$



Find $\sin(-7\pi/3)$

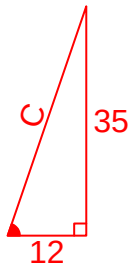
$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-7\pi/3) = \frac{-\sqrt{3}}{2}$

Question 3

If $\tan(\theta) = \frac{35}{12}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

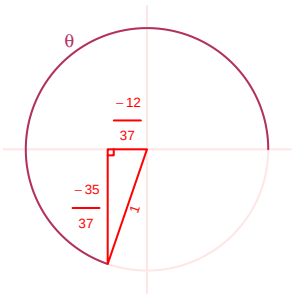
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$12^2 + 35^2 = C^2$$
$$C = \sqrt{12^2 + 35^2}$$
$$C = 37$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-12}{37}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 7.12$ meters, an amplitude of 8.99 meters, and a frequency of 4.48 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.99\cos(2\pi 4.48t) + 7.12$$

or

$$y = -8.99\cos(8.96\pi t) + 7.12$$

or

$$y = -8.99\cos(28.15t) + 7.12$$